APPENDIX 4

EN ROUTE INSTRUCTIONAL PROGRAM GUIDE

SECTION 1. INTRODUCTION

This IPG includes information about the following four development stages:

I. **FAA Academy Training (Course 50132).** Prepares the individual to enter facility training.

II. **Assistant Controller (Flight Data) (Course 55053).** Prepares the individual for assistant controller position qualification and certification. Includes OJT for qualification and certification on assistant controller positions.

III. **Nonradar/Radar-Associate Controller (Courses 55054 and 55056).** Prepares the individual for position qualification and certification on all nonradar/radar-associate positions. Includes OJT on nonradar/radar-associate positions.

IV. **Radar Controller (Courses 55055 and 55057).** Prepares the individual for qualification and radar certification on all radar positions. Includes OJT on the full range of controller duties.

SECTION 2. STAGE I: FAA ACADEMY TRAINING INITIAL EN ROUTE CONTROLLER TRAINING (Course 50132)

GENERAL: The purpose of this development stage is to provide new developmental specialists with an orientation and indoctrination to the FAA organization, to provide knowledge of job-related subjects in preparation for subsequent skill-oriented training, and to instruct in specific functions of the nonradar control positions while evaluating the potential of the developmental early in his/her prospective career.

This stage of training is administered in two parts: classroom instruction and classroom/laboratory environment.

PREREQUISITE:	Entry qualifications as established by Office of Personnel Management (OPM) announcements for ATCS positions.
CLASSROOM TRAINING:	The classroom portion of training is administered using lesson plans developed by the FAA Academy.
CLASSROOM/LABORATORY TRAINING:	This training is administered in a classroom/laboratory environment, utilizing FAA Academy-prepared instructional materials and a synthetic control area (Aero Center). This training is primarily oriented to procedural studies and demonstration/evaluation control scenarios.

1. CLASSROOM TRAINING.

a. FAA Orientation.

(1) The individual shall be thoroughly briefed on the following subjects:

(a) Employment.

(b) Civil rights.

(c) Student travel.

(d) Security.

(e) Human relations:

1 Value clarification.

2 Communication with others.

3 Team building.

4 Principle responsibilities of an employee.

(f) Employee handbook.

(g) Drug Awareness Program.

(2) Evaluation. The primary purpose of this training is to indoctrinate the individual into the workings of the Federal service. No examination is administered.

b. Fundamentals of Air Traffic Control. This training provides a basic knowledge of ATC-related subjects and is administered as a formal program of instruction.

(1) The individual shall complete the following objectives:

(a) Principles of flight.

(b) Aircraft identification and performance.

(c) Aviation weather.

(d) Navigation.

(e) Federal Aviation Regulations (FARs).

(f) Air traffic control communications.

(g) Air traffic services.

(h) Radar.

(i) Flight assistance service.

(j) National Airspace System (NAS).

(2) Evaluation.

(a) Knowledge. Block and end-of-lesson examinations, designed to provide feedback on how well the academic material presented was mastered, shall be administered.

1 Additional training shall be targeted toward any knowledge area that was not mastered on the examinations.

2 At the conclusion of the additional training period, a second academic exam shall be given. This exam shall include only those areas that were answered incorrectly on the first exam. Feedback shall be provided at the conclusion of this exam.

(b) Counseling. Instructors are responsible for providing initial counseling. It is important that timely counseling be provided when developmental weaknesses are identified in an attempt to resolve problems impeding the developmental's progress. Formal documentation of each counseling session is required and shall become part of the developmental's records.

2. CLASSROOM/LABORATORY TRAINING.

a. En Route Air Traffic Control.

(1) The individual shall be instructed in strategies to master a synthetic area chart of Aero Center, as well as any other sector map. Given a chart of the control area depicting NAVAIDs, centers/sectors, and boundaries, the developmental shall be able to draw and label the following:

(a) Airways and jet routes, including radials.

(b) NAVAIDs, those shown and not shown.

(c) Center, sector, and adjacent facility boundaries.

(d) Approach control boundaries and altitude limits.

(e) Minimum en route altitudes (MEAs), minimum reception altitudes (MRAs), minimum obstruction clearance altitudes (MOCAs), and minimum crossing altitudes (MCAs).

(f) Intersections.

(g) All mileages.

(h) Airports depicted in relation to their NAVAID.

(i) Uncontrolled airspace, the restricted area, and the prohibited area.

(j) All charted holding patterns.

(k) Instrument landing system (ILS) course at TUL and MLC (including fan markers).

(2) The individual shall be able to perform the following:

(a) Record clearances and control information on strips using approved symbols and abbreviations, and forward all revisions as required.

(b) Use correct radio and interphone message format and communication procedures.

(c) Issue clearances:

1 To provide separation.

2 According to priority.

3 That pertain to altimeters and altitude assignment.

4 To holding aircraft.

5 To departing and arriving aircraft.

(d) Encode and decode weather observations and PIREPs.

(3) The individual shall be able to demonstrate the ability to perform the following:

(a) Utilize a flight strip bay and load strip holders correctly.

(b) Given a proposal, departure, or flight plan estimate:

1 Determine if the strip contains the data required.

2 Determine the time between fixes within plus or minus 3 minutes.

3 Enter the time on the strips in the correct place.

4 Forward the data in the correct sequence and mark the strip to indicate the data have been forwarded.

(c) Given a proposal, departure, or flight plan estimate and revised information:

1 Make necessary revisions.

2 Determine if the revision needs to be forwarded and, if necessary, forward the revision to the appropriate sector or facility and mark the strip to indicate the revision has been forwarded.

(d) Given traffic situations, issue clearances:

1 To departing, arriving, and holding aircraft.

2 To provide separation.

3 According to altitude assignments or lateral separation.

(e) Use radio and communication procedures.

(4) The individual shall receive instruction and lab exercises that will familiarize him/her with nonradar air traffic control techniques to include the following:

(a) The equipment associated with pilot/ghost position and the computer inputs to simulate aircraft movement and position roles.

(b) The overview of nonradar separation.

(c) The procedures used in applying vertical separation.

(d) Airspace to be protected along airways or routes, arcs, and holding patterns and the separation minimums and procedures used to apply the appropriate lateral separation.

(e) The longitudinal separation of aircraft procedures on the same, converging, crossing, and opposite direction courses, along with changing altitudes.

(f) IFR departure procedures, including VFR release of an IFR departure.

(g) The procedures and phraseology for forwarding arrival information to approach control facilities, VFR towers, and flight service stations. Also included are issuing advance descent and approach clearances.

(h) Rules, procedures, and phraseology used when issuing holding instructions to aircraft.

(i) Procedures, phraseology for initial separation of departures, separation between departure and arrivals, and visual separation.

(j) Methods and techniques of board management and rules for providing air traffic control services.

(k) Nonradar visual scenarios—demonstration of nonradar rules by using radar as a visual aid.

(5) The individual shall be given instruction and lab exercises on basic radar techniques to include the following:

(a) The fundamentals of primary and secondary radar.

(b) Role of the radar controller.

(c) Functions of the components of the radar console.

(d) Meanings of the items that appear on the radar display.

(e) RDP messages—their composition, format, and entry.

(f) Rules and procedures for beacon code assignments; radar identification; handoffs; pointouts; safety alerts; vectors; departures and arrivals; approach issuance; speed adjustments; additional services; emergencies; and the terminology, responsibilities, and phraseology associated with each.

(g) Aircraft transponder requirements and procedures for altitude confirmation, Mode C validation, and the associated phraseology.

(h) Radar separation standards, en route minimum safe altitude warning (E-MSAW) and conflict alerts, radar service to VFR aircraft, and the use of minimum IFR altitude (MIA) charts.

(i) A brief history of the evolution and mission of the traffic management system and its programs, including the role of the participants in traffic management.

(j) Standard operating procedures (SOPs) and the controller responsibilities for conducting a position relief briefing.

(6) The individual shall be provided an overview of the radar associate position, to include the following:

(a) A description of the role of the radar associate controller, including the tasks and responsibilities involved in performing coordination, handling unusual situations, and resolving conflicts.

(b) FDP messages, their composition, format, and entry.

(c) The identification of appropriate scanning techniques and the resolution of inaccurate or contradictory information.

(d) Sector organization, situation awareness, and control action prioritization.

(e) A definition of the roles of the sector team members, the communications, workload management, and team performance skills necessary within the team.

(f) The use of controller resource management and the recognition of human performance factors.

b. Evaluation.

(1) Knowledge. Block and end-of-lesson examinations, designed to provide feedback on how well the academic material presented was mastered, shall be administered.

(2) Additional training shall be targeted toward any knowledge area that was not mastered on the examinations.

(3) At the conclusion of the additional training period, a second academic exam shall be given. This exam shall include only those areas that were answered incorrectly on the first exam. Feedback shall be provided at the conclusion of this exam.

3. PERFORMANCE VERIFICATION.

a. PV shall consist of an academic examination and an assessment of a skill-based scenario. A score of 70 percent is required for successful completion of the academic assessment.

b. PV specialists and/or operationally current support staff or supervisory personnel shall conduct the skill-based scenario assessments.

c. Students shall be assessed within the requirements outlined in the current edition of Order 7110.65 and Chapter 3 of this order.

d. Following the problem, the student shall be "debriefed" by the PV specialist. During this debrief, the PV specialist shall ask for explanations regarding questionable control actions and weigh responses in order to evaluate the student's cognitive skills. This investigation provides PV personnel the opportunity to identify areas that need improvement.

e. Students shall be assessed within the PV standards process. The standards process consists of four critical elements:

(1) Rater Reliability. Evaluation consistency is maximized by thorough training of temporary duty (TDY) PV personnel and instruction on the student debriefing process. This provides a reliable method for insuring that assessments take place in a similar manner from student to student.

(2) PV Scenarios. The scenarios incorporate field requirements, so when a student can perform the tasks necessary to successfully run a problem, he/she will have demonstrated the skills necessary to begin field training.

(3) PV Assessment. The PV process is based on expert assessment. PV is not assessing at the full performance skill level. Rather, PV determines if students have the fundamental knowledge necessary to begin field OJT. Initial assessments shall be conducted using one PV specialist observing one student.

(4) PV Reassessment. In the event of an unsuccessful PV scenario, the student shall receive additional training from the FAA Academy targeted to identified weaknesses. After completion of this training, another PV scenario shall be conducted using two PV specialists not involved in the first assessment. The two PV specialists shall then reach consensus before a decision can be made regarding the student's success or failure.

f. In the event a student is unsuccessful during the second assessment, PV shall notify the appropriate regional Air Traffic division. Disposition of the unsuccessful student shall be determined by the Air Traffic division in accordance with appropriate directives.

SECTION 3. STAGE II: ASSISTANT CONTROLLER TRAINING (FLIGHT DATA) (Course 55053)

GENERAL: The purpose of this stage is to prepare the developmental to perform independently (under general supervision) all duties of the assistant controller position on all sectors within an area of specialization and to attain certification on those positions.

This stage of training is administered in two parts: classroom instruction and OJT. The classroom training uses facility-prepared instructional materials to supplement the FAA Academy-prepared materials.

PREREQUISITE: Successful completion of Stage I PV.

CLASSROOM TRAINING: The classroom portion of training is administered using lesson plans developed by the FAA Academy and the facility and conducted under the direction of the TA. Facility lesson plans shall be developed for:

- Center/area of specialization knowledge.
- Flight data processing.
- Computer operations.

Evaluations shall be developed and administered for these lesson plans.

OJT: OJT shall be conducted in the operational environment under the direction of the individual's training team. OJT shall be conducted after successful completion of required classroom training.

1. **CLASSROOM TRAINING.** The individual shall successfully demonstrate the following skills and complete the following objectives.

a. Center Area Chart. Given a center area chart depicting the location of low- and high-altitude NAVAIDs, the individual shall:

(1) Label each NAVAID/fix with its correct identifier (including the first NAVAID outside the area).

(2) Depict all airways and jet routes extending from the first NAVAID/fix outside the area and label each.

(3) Depict and identify sector boundaries.

(4) Depict and identify special use airspace.

(5) Identify adjacent center sectors.

b. Area of Specialization Chart. Given a chart of the area of specialization depicting low-altitude and high-altitude NAVAID locations and center boundaries, the individual shall:

(1) Execute all items in paragraph 1a above.

(2) Indicate total mileage between NAVAIDs and/or fix posting.

(3) Depict and label all intersections.

(4) Depict and label restricted, prohibited, and warning areas and other special use airspace.

(5) Depict and label all approach control airspace, VFR towers, FSS locations, and class B, C, D, and E airspace.

c. Operating Communication System. Given an operational position containing a communication system (i.e., 300 system, Voice Switching Control System [VSCS], etc.), the individual shall:

(1) Place outgoing calls:

(a) Locate the interphone jack/dual jack module at the assistant position.

(b) Locate the interphone and radio jacks/dual jack module at the controller position.

(c) Identify and state the function of the five components of a pushbutton dial.

(d) Identify and state the function of the VSCS display module (VDM).

(e) Identify and state the function of the key panel module, short ring, ring and flash, and release keys.

(f) Place direct access calls.

(g) Place override calls.

(2) Receive incoming calls:

(a) Identify the basic components of the system/VDM on which incoming calls are received.

(b) Identify the audio/visual signals for an incoming call.

(c) Operate the radio transfer key when the:

1 Controller uses the I/R jack.

2 Controller uses the interphone jack.

3 Controller answers an interphone line.

4 Developmental answers an interphone line.

d. Flight Data Position (Nonautomated). Given an operational position, flight progress strips, and flight plan information, the developmental shall perform the full range of flight data duties in the nonautomated mode, including:

(1) Compute sector fix postings.

(2) Apply flight data procedures applicable to the assigned center.

(3) Pick up and sequence the strips for delivery.

(4) Place the strips in the appropriate bay at receiving sectors.

(5) Post and forward flight plan information.

e. Flight Data Position (Automated). Given an operational position in an automated environment that contains a computer entry device, the individual shall:

(1) Identify and state the function of the:

(a) Quick action keys.

(b) Alphanumeric keyboard.

(c) Computer readout device.

(d) Flight strip printer.

(e) Input/output typewriter.

(2) Prepare and enter computer messages in correct format.

(3) Respond to computer-generated messages.

(4) Pick up and sequence the strips for delivery.

(5) Place the strips in the appropriate bay at receiving sectors.

2. CLASSROOM TRAINING EVALUATION.

a. Locally prepared evaluations shall be administered on:

(1) The center chart.

(2) The area of specialization chart.

(3) Processing flight data in the nonautomated and automated modes.

(4) Computer message entry.

b. Additional evaluations may be developed to evaluate the individual's progress as deemed necessary to meet facility and/or individual training needs.

3. OJT. Through OJT, the developmental shall demonstrate the ability to satisfactorily perform the applicable job subtasks described in Appendix 2 of this order.

SECTION 4. STAGE III: NONRADAR AND RADAR-ASSOCIATE CONTROLLER TRAINING (Courses 55054 and 55056)

GENERAL: The purpose of this stage is to prepare the developmental to perform independently (under general supervision) all duties of a nonradar and a radar-associate controller on all sectors within the assigned area of specialization and to attain certification on those sectors (Course 55054).

This stage is subdivided into three types of training: classroom/situational training, simulation training, and OJT. Portions of this stage of training may be used for specialists who have lost their operational currency or who have transferred from another facility or area of specialization. The TA shall decide which portions of this stage will be administered based on the needs of the specialist. Pass/fail criteria shall also apply in this stage of training.

An optional administration of this stage of development (Course 55056) allows for the developmental to attain certification on two nonradar/radar-associate control positions of operation in an area of specialization. These sectors are selected for OJT and evaluation based on their potential to provide the developmental with realistic but fair standards in demonstrating an ability to handle control situations anticipated in the assigned area of specialization. After successfully obtaining certification on these two sectors, the developmental may proceed to the next stage of training: radar control (Course 55057).

PREREQUISITE:	Successful completion of Stage II (Assistant Controller Training).
CLASSROOM/SITUATIONAL TRAINING:	This training is conducted under the direction of the facility TA using self-study guides and lesson plans developed at the FAA Academy and at the local facility. Classroom/situational training should also include training exercises that allow the developmental to apply the knowledge acquired during the self-study and classroom training.
SIMULATION TRAINING:	Simulation training consists of familiarization, instructional, and evaluation exercises designed to allow the developmental to apply the basic skills and knowledge gained during classroom/situational training.
OJT:	OJT shall provide the developmental the opportunity to apply his or her knowledge and skills in an operational environment.

1. NONRADAR CLASSROOM TRAINING. Classroom training shall include the following:

a. The En Route Study Guide (ES-7-1).

b. Detailed chart of assigned area of specialization. Given a chart of the assigned area of specialization depicting low-altitude and high-altitude NAVAID symbols, the developmental shall be able to:

(1) Label each NAVAID in the area of specialization and the first NAVAID outside the area of specialization.

(2) Depict and label adjacent sector and facility boundaries.

(3) Depict the airways extending from the first NAVAID outside the sectors and label each.

(4) Depict and label all intersections.

(5) Depict the mileage between NAVAIDs and/or fix postings on each route segment.

(6) Label all MEAs, MRAs, MOCAs, and MCAs.

(7) Depict and label restricted, prohibited, and warning areas and other special use areas.

(8) Depict and label all approach control airspace, VFR towers, and FSSs.

(9) Depict and label the following information for those airports within the area of specialization not served by a full-time approach control facility that have published penetration/approach procedures:

(a) Published holding pattern direction and turns.

(b) Initial penetration/approach altitude.

(c) Initial penetration/approach fix.

(d) Outbound and inbound heading/bearing/radial.

(e) Direction of procedure turn (if applicable).

(f) Missed approach procedures and altitudes.

c. Special Military Operations self-study guide and assessments (ES-7-2 and ES-7-2.1 thru ES-7-2.8).

d. Letters of agreement and facility orders pertinent to the assigned area of specialization.

e. Phraseology/Strip Marking self-study guide and assessment (EW-7-1 and EW-7-1.1).

f. Additional requirements as identified by the facility (e.g., depict standard instrument departures [SIDs]/standard terminal arrivals [STARs], depict Class B, C, D, and E airspace).

2. NONRADAR CLASSROOM/SITUATIONAL TRAINING.

a. The facility training department shall instruct the following FAA Academy-developed lesson plans:

E-8-26	Recording Clearances and Control Information
E-8-27	Radio and Interphone Communication
E-8-29	Vertical Separation
E-8-30	Longitudinal Separation
E-8-31	Lateral Separation
E-8-33	General Control and Board Management
E-8-34	IFR Clearances and Route Assignments
E-8-35	IFR Flight Direction, Altitude Assignment, and Altimeter Setting
E-8-38	Approaches
E-8-39	Initial Separation of Departures/Arrivals and Visual Separation
E-8-40	Holding Aircraft
E-8-42	Forwarding Control Information
E-8-44	Air Traffic Services
E-8-45	Lost Communication Procedures
E-8-46	Initiating Emergency Procedures
E-8-47	VFR and VFR/OTP Procedures
E-8-48	Special VFR

b. Each facility will develop nonradar classroom skills development exercises that allow developmentals to apply specific skills and knowledge acquired during academic instruction. The exercises will provide the developmental with the opportunity to:

(1) Record clearances and control information on strips.

(2) Use correct radio and interphone message format and communication procedures.

(3) Determine the need for separation (plotting and projecting).

(4) Issue clearances according to priority.

(5) Apply effective board management.

3. NONRADAR SIMULATION TRAINING.

a. During the nonradar simulation stage of training, the developmental will apply nonradar ATC procedures in accordance with Order 7110.65 and other pertinent directives. Guidelines for development and administration of simulation scenarios are listed in paragraph 6 of this section.

b. Nonradar simulation scenarios will be conducted in a one-position sector configuration.

c. Nonradar Familiarization Scenarios. The developmental shall be given nonradar familiarization scenarios on one sector in the assigned area of specialization. The scenarios will provide a highly interactive instructional environment in which the instructor and developmental will be able to discuss strategies and alternatives.

d. Nonradar Instructional/Evaluation Scenarios.

(1) Instructional scenarios provide the developmental with the opportunity to practice performing nonradar ATC duties in a simulated operational environment.

(2) The TA shall determine the number of nonradar instructional scenarios the developmental will complete. Periodic evaluation scenarios shall be conducted to determine the developmental's progress through the completion of the instructional scenarios.

(a) Example: For areas of specialization that have sectors where lack of radar coverage requires extensive use of nonradar control procedures, the TA may require the administration of 11 instructional scenarios, with instructional scenario numbers 8 and 11 as evaluations.

(b) Example: For areas of specialization that have sectors where lack of radar coverage or existing procedures require only occasional use of nonradar control procedures, the TA may determine that no instructional scenarios need be administered.

(3) If the developmental's training program calls for the administration of facility-developed evaluation scenarios, they shall be administered at regular intervals during the nonradar procedures laboratory segment of training. The evaluations shall be pass/fail. If the developmental does not meet the requirements for successful completion of the scenario, the TA may determine that skill enhancement training is warranted. The skill enhancement training may include:

(a) Classroom instruction,

(b) CBI courseware, and/or

(c) Instructional scenarios.

Skill enhancement training shall be followed by a re-evaluation scenario at the same complexity point level as that at which the failure occurred.

(4) Developmentals shall be removed from training if they fail to meet the requirements for satisfactory completion of nonradar training.

e. Nonradar Scenario Development. The following situations and procedural items shall be included in the simulation scenarios. Other items may be added as deemed appropriate by the TA, based on their applicability in the developmental's sectors.

(1) Applying Separation Rules:

(a) Crossing, converging, and passing in opposite directions.

(b) Overtakes.

(c) Separation from: adjacent airspace, obstructions, and special use airspace.

(d) Successive arrivals and departures.

(e) Simultaneous arrivals and departures.

(f) Arrivals with altitudes inverted.

(2) Communication and Coordination:

(a) Hearback/readback errors.

(b) Transfer of control and communications.

(c) Communication with aircraft through other than direct pilot-controller communication.

(d) Inter/intra facility coordination.

(e) Coordinate restrictions.

(f) Verify information.

(3) Clearances and Control Information:

(a) IFR clearances.

(b) Clearance to alternate airport.

(c) VFR-on-top (VFR/OTP).

(d) VFR traffic encountering IFR.

(e) Route change in flight.

(f) Arrivals and departures.

(g) Approaches, including high-altitude IFR approaches.

(h) Holding.

(i) Transfer of control and communications.

(j) Airfiles and VFR popups.

(k) Pilot deviations.

(l) Request for altitude change at assigned altitude.

(4) Procedures:

(a) Interphone.

(b) Metering/Flow control.

(c) Fuel dumping.

(d) Approach control saturation.

(e) Special flight operations.

(f) Military (e.g., special use airspace [SUA], altitude reservations [ALTRVs], aerial refueling).

(5) Emergencies and Equipment Outages:

(a) Loss of communication.

(b) Inflight emergencies.

(c) Aircraft with minimum fuel.

(d) NAS control equipment failures (e.g., communications, NAVAIDs).

(e) Inflight equipment malfunctions.

(f) Overdue aircraft.

(g) Hijacking.

(6) Weather:

(a) Reporting and disseminating weather information.

(b) Changes to routes due to weather (e.g., departures, arrivals, en route).

f. Nonradar Scenario Complexity Workload. The worksheet on the following pages is used in determining the complexity workload for each nonradar scenario. The worksheet allows inclusion of the particular characteristics encountered in each sector for which scenarios are being developed. After establishing the desired complexity level for a given scenario, use the worksheet to arrive at the desired numerical total plus or minus three points for that scenario. Local reproduction of this worksheet is approved.

FIGURE 1. CONTROL SCENARIO COMPLEXITY WORKLOAD WORKSHEET

Center: _____
Scenario Number: _____
Sector Number: _____
Point Factor: _____ points

I. FUNCTIONS	NUMBER OF FUNCTIONS	POINT VALUE	TOTAL POINTS	
A. Departure		5		
B. Arrival		4		
C. En Route (requiring control function)		4		
D. En Route (no control function)		2		
E. Emergency or Radio Failure (Problems _____)		4		
F. Special Flights (7110.65, Chapter 9)		3		
G. Required Coordination (additional points when above functions require coordination)		1		
				Totals

FIGURE 1. CONTROL SCENARIO COMPLEXITY WORKLOAD WORKSHEET
(Continued)

II. PROBLEM CONTENT

A. High-Altitude Instrument Approach	
B. Sector Radio Equipment Failure (Problems _____)	
C. Visual Separation	
D. Special VFR	
E. Composite Flight Plans	
F. Airfiles	
G. VFR OTP Flights	
H. Inter-Center Coordination	
I. Intra-Center Coordination	
J. Civil Jets (climbing or descending into/out of high altitude)	
K. Pilot Requesting Altitude Change En Route	
L. Revisions: 1. from adjacent centers	
2. pilot revises estimates	
3. pilot requests route change	
M. Direct Route Flights	
N. SIGMETs	
O. NOTAMs	
P. Non-Receipt of Position Reports (not a radio failure)	
Q. Weather Below Minimums (requiring change in destination)	
R. Weather Below Minimums (requiring missed approach and holding for change in weather)	
S. Two-Way Radio Communications Failure	
T. NAVAID Failure	
U.	
V.	
W.	
X.	
Y.	
Z.	

(1) Complexity Workload. Function values are as follows:

(a)	Departure	5
(b)	Arrival	4
(c)	En route (requiring control function)	4
(d)	En route (no control function)	2
(e)	Emergency or aircraft radio failure	4
(f)	Special flight	3
(g)	Required coordination (additional point for each required coordination function associated with the above functions)	1

(2) Complexity Definitions.

(a) A departure is defined as an aircraft that originates IFR flight in the scenario sector. A popup or airfile en route is counted as a departure.

(b) An arrival is defined as an aircraft that terminates IFR flight within the scenario sector. An aircraft requesting special VFR flight is counted as an arrival.

(c) "En route (requiring control function)" refers to an aircraft that originates outside and passes through the scenario sector requiring controller action.

(d) "En route (no control function)" refers to an aircraft that originates outside and passes through the scenario sector requiring only routine communication.

(e) An en route aircraft operating at an altitude under approach control jurisdiction is counted as an en route and a coordination factor.

(f) An emergency is defined as a distress or urgency condition requiring controller action. When an emergency is planned in the scenario, use an en route aircraft.

(g) When a radio failure is planned in the scenario, use an en route aircraft.

(3) Scenario Program Example. The example in Figure 2 shows how a training program may be designed to fulfill the requirements of this stage.

FIGURE 2. NONRADAR SIMULATION SCENARIOS

Scenario	Complexity Points	Type
A	70	Familiarization
B	75	Familiarization
C	80	Familiarization
D	80	Familiarization
E	85	Familiarization
F	85	Familiarization
G	85	Familiarization
H	90	Familiarization
I	90	Familiarization
J	90	Familiarization
1	70	Instructional
2	75	Instructional
3	80	Instructional
4	80	Instructional
5	85	Instructional
6	90	Instructional
7	90	Evaluation-Preparatory
8	90	Evaluation (Pass/Fail)
9	95	Instructional
10	95	Instructional
11	95	Evaluation (Pass/Fail)

4. RADAR-ASSOCIATE CLASSROOM/SITUATIONAL TRAINING.

a. The facility training department shall provide the following instruction:

(1) FAA Academy-developed lesson plans:

E-11-1	Fundamentals of Radar
E-11-2	Radar Data Display
E-11-3	Radar Equipment
E-11-4	RDP Message Entry
E-11-5	Beacon Code Assignment
E-11-6	Radar Identification
E-11-7	Radar Handoff and Pointout
E-11-8	Radar Separation and Safety Alerts
E-11-9	Radar Vectoring
E-11-10	Radar Departures and Arrivals
E-11-11	Speed Adjustment
E-11-12	Radar Emergencies
E-11-13	Additional Services
E-11-15	Position Relief Briefing
E-11-17	Radar Controller Scan

(2) DARC operations.

(3) Sector team responsibilities.

b. Each facility will develop part-task exercises that allow developmentals to apply skills and knowledge acquired during academic instruction. The exercises will provide the developmental with the opportunity to:

(1) Enter computer messages from the radar-associate position.

(2) Identify radar map symbols, function keys, aircraft, weather, etc., on radar displays.

(3) Make beacon code assignments.

(4) Practice radar identification and Mode C verification procedures.

(5) Practice the transfer of radar identification.

(6) Apply knowledge of radar separation minimums.

(7) Identify when to integrate nonradar procedures into a radar environment to ensure positive separation.

(8) Perform a position relief briefing.

5. RADAR-ASSOCIATE SIMULATION TRAINING.

a. During the radar-associate simulation stage of training, the developmental will apply ATC procedures in accordance with Order 7110.65 and other pertinent directives. General guidelines for development and administration of simulation scenarios are listed in paragraph 6 of this section.

b. All radar-associate scenarios shall be conducted in a two-position sector configuration with the developmental working the radar-associate position. The radar position may be worked by a certified radar controller, a support specialist, or a contract instructor.

c. Familiarization Scenarios. The developmental shall be given radar-associate familiarization scenarios on one sector in the assigned area of specialization. The scenarios will provide a highly interactive instructional environment in which the instructor and developmental will be able to discuss strategies and alternatives. These scenarios should emphasize the importance of effective interaction between the radar associate and other sector team members.

d. Radar-Associate Instructional/Familiarization Scenarios.

(1) Instructional scenarios provide the developmental with the opportunity to practice performing radar-associate ATC duties in a simulated operational environment.

(2) The TA shall determine the number of radar-associate instructional scenarios the developmental will complete. Evaluation scenarios shall be administered at regular intervals during the radar-associate laboratory segment of training. The evaluations shall be pass/fail.

(a) Example: For areas of specialization that have sectors where lack of radar coverage requires extensive use of nonradar control procedures, the TA may require the administration of 30 instructional scenarios, with instructional scenario numbers 10, 14, 18, 22, 26, and 30 as evaluations.

(b) Example: For areas of specialization that have sectors where there is no lack of radar coverage or where existing procedures require only occasional use of nonradar control procedures, the TA may require 20 instructional scenarios, with instructional scenario numbers 11, 14, 17, and 20 as evaluations.

(3) If the developmental does not meet the requirements for successful completion of the scenario, the TA may determine that skill enhancement training is warranted. The skill enhancement training may include:

(a) Classroom instruction, and/or

(b) Instructional scenarios.

Skill enhancement training shall be followed by a re-evaluation scenario at the same level as that at which the failure occurred.

(4) Developmentals shall be removed from training if they fail to meet the requirements for satisfactory completion of radar-associate training.

e. Radar-Associate Scenario Development. The following situations and procedural items shall be included in the familiarization and instructional scenarios. Other items may be added as deemed appropriate by the TA, based on their applicability in the individual sectors.

(1) Applying Separation Rules (radar and nonradar):

(a) Crossing, converging, and opposite direction traffic.

(b) Overtakes.

(c) Separation from: adjacent airspace, obstructions, and special use airspace.

(d) Successive arrivals and departures.

(e) Simultaneous arrivals and departures.

(f) Arrivals with altitudes inverted.

(2) Communication and Coordination:

(a) Hearback/readback errors.

(b) Transfer of control and communications.

(c) Communication with aircraft through other than direct pilot-controller communication.

(d) Inter/intra facility coordination.

(e) Coordinate restrictions.

(f) Verify information.

(3) Clearances and Control Information:

(a) IFR clearances.

(b) Clearance to alternate airport.

(c) VFR/OTP.

(d) VFR traffic encountering IFR.

(e) Route change in flight.

(f) Arrivals and departures.

(g) Approaches, including high-altitude IFR approaches.

(h) Holding.

(i) Transfer of control and communications.

(j) Airfiles and VFR popups.

(k) Pilot deviations.

(l) Request for altitude change at assigned altitude.

(4) Procedures:

(a) Interphone procedures.

(b) Metering/Flow control.

(c) Fuel dumping.

(d) Approach control saturation.

(e) Special flight operations.

(f) Military procedures (e.g., SUA, flight breakups, MARSA, ALTRVs, aerial refueling).

(g) Areas of marginal radar coverage.

(h) Loss of radar requiring the use of nonradar procedures.

(i) Traffic alert and collision avoidance system (TCAS) resolution advisory.

(5) Emergencies and Equipment Outages:

(a) Loss of communication.

(b) Inflight emergencies.

(c) Aircraft with minimum fuel.

(d) NAS control equipment failures (e.g., communications, NAVAIDs).

(e) Inflight equipment malfunctions.

(f) Overdue aircraft.

(g) Hijacking.

(h) Loss of Mode C or transponder failure.

(i) Unexpected aircraft performance.

(6) Weather:

(a) Reporting and disseminating weather information.

(b) Changes to routes due to weather (e.g., departures, arrivals, en route).

f. During the radar-associate simulation stage of training, the developmental will perform the following in accordance with Order 7110.65:

(1) Issue clearances using correct phraseology.

(2) Forward control information using correct phraseology.

(3) Record clearances and control information on strips, using approved symbols and abbreviations.

(4) Communicate using radio and interphone procedures.

(5) Use effective board management techniques.

(6) Demonstrate situational awareness.

(7) Obtain information from an aircraft in an emergency and notify the proper facilities.

(8) Obtain and disseminate weather information.

(9) Demonstrate knowledge of all applicable letters of agreement.

(10) Demonstrate knowledge of the assigned area of specialization.

(11) Give and receive a position relief briefing.

g. Radar-Associate Scenario Difficulty. This section covers the development of radar-associate scenarios. A radar associate must control varying volumes of traffic and resolve situations of varying complexity. Volume level is the basic criterion for scenario development.

(1) Complexity Factor. Scenario complexity is based on the number of situations which require a radar-associate controller to apply the various procedures in Order 7110.65, such as separation, making/receiving handoffs, VFR-weather advisories, vectoring, and emergencies.

(2) Volume Level Criteria. This element refers to the hourly operations rate.

(a) The hourly operations rate is computed using the following method:

1 Take a sector traffic sample of the busiest 8-hour period during a facility's "busy" day (37th busiest day of year), a facility's "peak" day, and a facility's average day (based on the average traffic during the previous calendar year).

2 Add the number of aircraft handled during each of the three 8-hour periods and divide by 24.

(b) The hourly operations rate calculated using the above method shall be the 100 percent volume level. Other volume levels can be calculated accordingly.

(c) The hourly operations rate at the 100 percent level shall be a minimum of 25.

EXAMPLE:

DAY	# OF AIRCRAFT
Busy	240
Peak	320
Average	230

The hourly operations rate would be 790 divided by 24, which equals 33. The 100 percent volume level for this sector is 33.

(3) Guidelines for Radar-Associate Scenarios.

(a) Conflict alert shall be deactivated during every other scenario, and during all evaluation scenarios.

(b) An attempt should be made to develop scenarios that have an even flow of traffic.

(c) Position relief briefings shall be received and given on all instructional scenarios.

(4) Scenario Program Example. The example in Figure 3 shows how a training program may be designed to fulfill the requirements of this stage.

FIGURE 3. RADAR-ASSOCIATE SIMULATION SCENARIOS

Scenario	Volume (%)	Type
A	70	Familiarization
B	70	Familiarization
C	75	Familiarization
D	75	Familiarization
E	75	Familiarization
1	80	Instructional
2	80	Instructional
3	80	Evaluation-Preparatory
4	80	Instructional
5	80	Evaluation (Pass/Fail)
6	85	Instructional
7	85	Instructional
8	90	Instructional
9	90	Instructional
10	90	Evaluation (Pass/Fail)
11	95	Instructional
12	95	Instructional
13	95	Instructional
14	100	Instructional
15	100	Evaluation (Pass/Fail)

h. Additional Scenarios.

(1) Following the successful completion of the evaluations and prior to the start of OJT, additional scenarios may be administered for the developmental's initial OJT sector. The number and duration of scenarios will be determined by the TA based on the needs of the area of specialization.

(2) It is recommended that developmentals receive sector-specific scenarios prior to starting OJT on each new sector.

6. NONRADAR/RADAR-ASSOCIATE SCENARIO GUIDELINES. The following guidelines are designed to assist in the development of scenarios. The guidelines also provide for standard administrative procedures. All personnel involved in the development of scenarios for use in the National En Route Traffic Training program shall follow these guidelines.

a. Development Guidelines.

(1) Each scenario shall be 60 minutes in duration.

(2) Scenarios shall progress in complexity. It is necessary to complete scenarios at the lowest level of complexity first and progressively work up to the highest.

(3) Scenarios shall reflect the current operations in the area of specialization.

(4) When weather is a factor in the scenario, this shall be indicated in the scenario Instructor Guide and Remote Guide, to ensure that the remote position will have the necessary information.

(5) The instructor shall assist as necessary to keep problem continuity, except during evaluation scenarios.

b. Administrative Guidelines.

(1) The TA will determine the number of scenarios the developmental must complete.

(2) A preparatory evaluation scenario must be administered prior to the first evaluation scenario.

(3) Developmentals cannot be evaluated on any procedures or situations that they have not had experience with in previous scenarios.

(4) The results of the developmental's performance during each scenario shall be recorded on FAA Form 3120-25 and discussed with the developmental (see Appendix 2 of this order for instructions). Forms used during the evaluation scenario shall be retained and filed.

(5) If the developmental does not meet the requirements for successful completion, the provisions of FAPM Letter 330-1 shall be followed.

c. Instructor Guide. An Instructor Guide shall be developed for each control scenario. The purpose of the guide is to relay instructional intent from the scenario developer to the lab instructor. The guide shall be divided into three sections:

(1) Information for Instructor. This section describes the scenario content and objectives.

(2) Instructor Action. This section describes the actions required to accomplish the scenario objectives.

(3) Developmental Application and Technique. This section lists the information to be provided to the developmental prior to the start of the scenario (e.g., scenario objectives, starting conditions).

d. Remote Guide. A Remote Guide shall be developed for each control scenario. This guide provides the remote controller with instructions essential to the scenario (e.g., remote strips, scenario plus time, next-fix estimates, and initial contact times). Any pertinent remarks, such as when to declare an emergency, the type of emergency and pilot's intentions, altitude requests, destination changes, fuel problems, etc., should be noted in the Remote Guide as well as the Instructor Guide.

7. OJT. Nonradar/Radar-Associate Position Operation. Through OJT, the developmental shall demonstrate the ability to satisfactorily perform the applicable job subtasks listed in Appendix 2 of this order.

SECTION 5. STAGE IV: RADAR CONTROLLER TRAINING (Courses 55055 and 55057)

GENERAL: The purpose of this development stage is to qualify the developmental to perform the full range of duties and attain certification on all radar positions of operation in an area of specialization (Course 55055).

This stage is subdivided into three types of training: classroom/situational training, simulation training, and OJT. Portions of this stage of training may be used for specialists who have lost their operational currency or specialists who have transferred from another facility or area of specialization. The TA shall ascertain which portions of this stage will be administered based on the needs of the specialist. Pass/fail criteria shall also apply in this stage of training.

An optional administration of this stage of development (Course 55057) allows for the developmental to attain certification on two radar positions of operation in an area of specialization. After successfully obtaining certification on these two sectors, the developmental shall be required to qualify on all remaining radar-associate/radar sectors within the assigned area of specialization. The developmental shall be required to certify on a radar-associate position before proceeding to the associated radar position. If the developmental is unable to receive OJT on the next available radar position, he/she should be given OJT on the next available radar-associate position. The certification process should be radar associate-radar, radar associate-radar, etc. Certification on the radar-associate position will precede certification on the radar position. (Log as Course 55057.)

PREREQUISITE:	Successful completion of Stage III (Nonradar/Radar-Associate Controller Training).
CLASSROOM/SITUATIONAL TRAINING:	This training is administered using FAA Academy-developed and facility-developed course materials for instruction of ATC procedures. This academic component of training consists of classroom instruction and adequate practice using CBI and/or DYSIM exercises.
SIMULATION TRAINING:	This training consists of DYSIM laboratory time to administer the necessary familiarization, instructional, and evaluation scenarios.
OJT:	OJT shall be administered in an operational environment.

1. CLASSROOM/SITUATIONAL TRAINING.

a. The facility training department shall instruct the following FAA Academy-developed lesson plans for Courses 55055 and 55057:

E-11-1	Fundamentals of Radar
E-11-2	Radar Data Display
E-11-3	Radar Equipment
E-11-4	RDP Message Entry
E-11-5	Beacon Code Assignment
E-11-6	Radar Identification
E-11-7	Radar Handoff and Pointout
E-11-8	Radar Separation and Safety Alerts
E-11-9	Radar Vectoring
E-11-10	Radar Departures and Arrivals
E-11-11	Speed Adjustment
E-11-12	Radar Emergencies
E-11-13	Additional Services
E-11-15	Position Relief Briefing
E-11-17	Radar Controller Scan

b. Radar Qualification Examination.

(1) Prior to entering a simulated radar environment, the developmental shall pass the radar qualification examination obtained from the FAA Academy. If the developmental does not meet the requirements for successful completion of the examination, the TA may determine that skill enhancement training is warranted.

(2) Skill enhancement training may include:

(a) Additional classroom instruction, and/or

(b) CBI training.

(3) If the developmental does not pass the radar qualification examination after additional training, the provisions of FAPM Letter 330-1 shall be followed.

c. Area-Specific Training.

(1) Additional basic skills training shall result in the developmental being able to accomplish the following:

(a) Locate and identify each radar system serving the assigned area of specialization.

(b) Describe the radar coverage and any limitation pertaining to the area of specialization and adjacent areas.

(c) Identify the radio equipment and landlines associated with the radar positions.

(d) Explain in detail applicable LOAs and any special procedures.

(2) The TA shall develop an evaluation instrument to assess area-specific knowledge.

2. SIMULATION TRAINING.

a. Familiarization Scenarios. These scenarios should provide a highly interactive instructional environment in which the instructor and developmental will be able to discuss strategies and alternatives related to the performance of air traffic duties. The scenarios should emphasize the importance of effective interaction between the radar controller and other team members.

b. Instructional Scenarios. These scenarios provide the developmental with the opportunity to practice performing radar ATC duties in a simulated operational environment.

c. General Guidelines.

(1) Given a radar sector in the assigned area of specialization, the developmental will apply ATC procedures in accordance with all applicable directives.

(2) The developmental shall complete scenarios at a lower level of complexity first and progressively work to the highest.

(3) The results of the developmental's performance during each scenario shall be recorded on FAA Form 3120-25 and discussed with the developmental (see Appendix 2 of this order). Forms used during evaluation scenarios shall be retained in the developmental's training folder as specified in Chapter 2, Section 4 of this order.

(4) Scenarios should be 60 minutes in duration.

(5) The developmental shall be given radar familiarization scenarios on one sector in the assigned area of specialization.

(6) Instructional scenarios shall be conducted in a two-position, single-sector configuration with the developmental working the radar position. The radar-associate position may be worked by a certified radar controller, a support specialist, a contract training instructor, or an individual who has successfully completed Stage III of training.

(7) The TA shall determine the number of radar simulation scenarios that the developmental will complete. Periodic evaluation scenarios shall be conducted to determine the developmental's progress through the completion of the instructional scenarios.

Example: The TA may require the administration of 5 familiarization and 15 instructional radar scenarios, with instructional scenario numbers 5, 10, and 15 as evaluation scenarios.

(8) Evaluation scenarios shall be administered at regular intervals during the instructional scenario segment of training. The evaluations shall be pass/fail.

(9) A preparatory evaluation scenario shall be administered prior to the first evaluation scenario.

(10) Developmentals cannot be evaluated on any procedures or situations that they have not had experience with in previous scenarios.

(11) The instructor shall assist, as necessary, to keep scenario continuity, except during pass/fail evaluation scenarios.

(12) If the developmental does not meet the requirements for successful completion of the scenario, the TA may determine that skill enhancement training is warranted. This training may include:

(a) Classroom instruction,

(b) CBI training, and/or

(c) Scenarios.

Skill enhancement training will be followed by an evaluation scenario at the same level as the scenario that the developmental did not complete satisfactorily.

(13) If the developmental does not meet the requirements for successful completion after skill enhancement training, the provisions of FAPM Letter 330-1 shall be followed.

d. Guidelines for the Development of Simulation Scenarios.

(1) Complexity Factors. Complexity factors are those situations which require a radar controller to apply the various procedures in Order 7110.65 and other applicable directives (see examples in paragraph 2e below). The number of complexity factors in a scenario shall be increased as the volume level is increased.

(2) Volume Level Criteria. See Section 4, paragraph 5g(2) of this appendix for detailed instructions.

(3) Instructor Guide and Remote Guide. See Section 4, paragraphs 6c and 6d of this appendix for instructions.

(4) Conflict alert shall be deactivated during every other scenario and during all evaluation scenarios.

(5) Scenarios shall include unusual situations and seldom-used procedures.

(6) Scenarios shall reflect the current operations in the developmental's area of specialization.

(7) Position relief briefings shall be received and given on all simulation scenarios.

e. Radar Instructional Scenario Complexity Factors. The following complexity factors (situations and procedural items) should be included in the scenarios based on their applicability in the area of specialization. The TA shall determine which of the following situations and procedural items will be included in the evaluation scenarios.

(1) All radar identification methods and radar termination.

(2) Vectoring (e.g., to geographical point, to final approach course, for separation, departures, off route, around weather, no-gyro, flight breakup, sequencing).

(3) Departures and arrivals simultaneously in sector.

(4) Separation (e.g., overtaking situations; crossing, converging, and opposite direction traffic; from adjacent airspace, obstructions, and special use airspace; primary to primary, beacon to beacon, and beacon to primary; radar and nonradar).

(5) Request to VFR/OTP.

(6) Request control from adjacent controller.

(7) Release control to adjacent controller.

(8) Service to VFR aircraft (e.g., encountering IFR, providing advisories).

(9) Cancellation of IFR.

(10) Inflight emergency.

(11) Special flight operations.

(12) Aircraft with minimum fuel and fuel dumping.

(13) Aircraft equipment failures (e.g., communications, navigation equipment, Mode C, and/or transponder failure).

(14) Request for altitude change.

(15) Successive arrivals and departures.

(16) Approach control saturation.

(17) Arrivals with altitudes inverted.

(18) Military procedures (e.g., change in destination, aerial refueling, ALTRVs, formation flights, MARSA, high-altitude penetration, IFR military training routes (IRs) and VFR military training routes (VRs), etc.).

(19) Weather (e.g., route change in flight, change in departure/arrival route, deviations, below minimums requiring missed approach and holding, etc.).

(20) Communicating with aircraft through other than direct pilot-controller communication.

(21) Marginal radar coverage.

(22) Loss of radar requiring the use of nonradar procedures.

(23) Control equipment failures (e.g., NAVAIDs, radar, communications).

(24) Handoffs and pointouts (e.g., sector to sector, facility to facility, in relation to preceding flights, etc.).

(25) Refusal, noncompliance, and/or nonreceipt of clearance, unexpected aircraft performances, erroneous readbacks, etc.

(26) Holding (e.g., implementing and recovering from holding procedures; loss of communications; alternate airport; minimum fuel; reidentifying aircraft).

(27) Clearances (e.g., IFR, approaches, to alternate airport, etc.).

(28) Obtaining and disseminating weather information.

(29) Application of approach control procedures and/or services (e.g., arrival and departure, simultaneous and successive).

(30) Hijack.

(31) Airfiles and popups.

(32) Air Evac or Air Ambulance (Lifeguard).

(33) Overdue aircraft.

(34) TCAS resolution advisory.

(35) NOTAMs.

(36) Other (specify).

f. Scenario Program Example. Figure 4 shows an example of how a training program may be designed to fulfill the requirements listed above.

FIGURE 4. RADAR SIMULATION SCENARIOS

Scenario	Volume (%)	Type
A	70	Familiarization
B	70	Familiarization
C	75	Familiarization
D	75	Familiarization
E	75	Familiarization
1	80	Instructional
2	80	Instructional
3	80	Evaluation-Preparatory
4	80	Instructional
5	80	Evaluation (Pass/Fail)
6	85	Instructional
7	85	Instructional
8	90	Instructional
9	90	Instructional
10	90	Evaluation (Pass/Fail)
11	95	Instructional
12	95	Instructional
13	95	Instructional
14	100	Instructional
15	100	Evaluation (Pass/Fail)

g. Additional Scenarios.

(1) Following successful completion of the evaluations and prior to the start of OJT, additional control scenarios may be administered on each sector in the developmental's area of specialization. These scenarios are intended to introduce the developmental to sector-specific operations and traffic flows.

(2) The scenarios will provide a highly interactive instructional environment in which the instructor and developmental will be able to discuss strategies and alternatives.

(3) The number of scenarios will be determined by the TA based on the needs of the area of specialization.

(4) Control scenarios may use combined sector and position configurations.

3. OJT.

a. Through OJT, the developmental shall demonstrate the ability to satisfactorily perform the applicable job subtasks described in Appendix 2 of this order.

b. Developmentals shall receive a minimum of 1 hour of instruction on the primary backup system prior to certification on the first radar sector. (The type and method of training will be determined by the facility ATM and will be coordinated with the appropriate bargaining unit at the local level.)